

bella Mett. Bulletin of the Torrey Botanical Club, 53: 1-6. Jan., 1926.

PICKETT, F. L., and THAYER, LEWIS A. The Gametophytic Development of Certain Ferns: *Polypodium vulgare* L. var. *occidentale* Hook. and *Pellaea densa* (Brack.) Hook. Bulletin of the Torrey Botanical Club, 54: 249-255. Mar., 1927.

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Notes on a New Jersey Fern Garden—II.

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PELLAEA ATROPURPUREA

Purple Cliff Brake suggests to me the limestone ridges of northwestern New Jersey. On a fern hunting expedition in 1928 to the vicinity of Newton this cliff brake was found in considerable abundance. Walking fern was plentiful in places and rue-spleenwort not uncommon, but I was chiefly interested in the cliff brake as the others were already in my garden and there was a little limestone cliff, or rather part limestone, waiting for new tenants.

Rue Spleenwort (*Asplenium Ruta-muraria*) was found the year before on rock ledges near Cranberry Lake. The ledges were not limestone and the plants were all small, hardly over an inch in length. A few were brought home and planted on the miniature cliff; they are still growing but are no larger than when found. Near Newton *Ruta-muraria* was found on limestone rocks, often in company with Purple Cliff Brake and Maidenhair Spleenwort and perhaps all three would be crowding each other for the same foothold. In one tiny crevice was found three little fronds, one of each kind, crowded together. The group was carefully lifted and

replanted on my miniature cliff in the garden, where they were permitted to continue their struggle. Now, two years later, *Pellaea atropurpurea* seems to have won the contest; this year it sent up a tall, slim fertile frond as sign of victory. *Ruta-muraria* has disappeared and *Asplenium Trichomanes*, exhausted, was able to hold up only two dwarfed fronds.

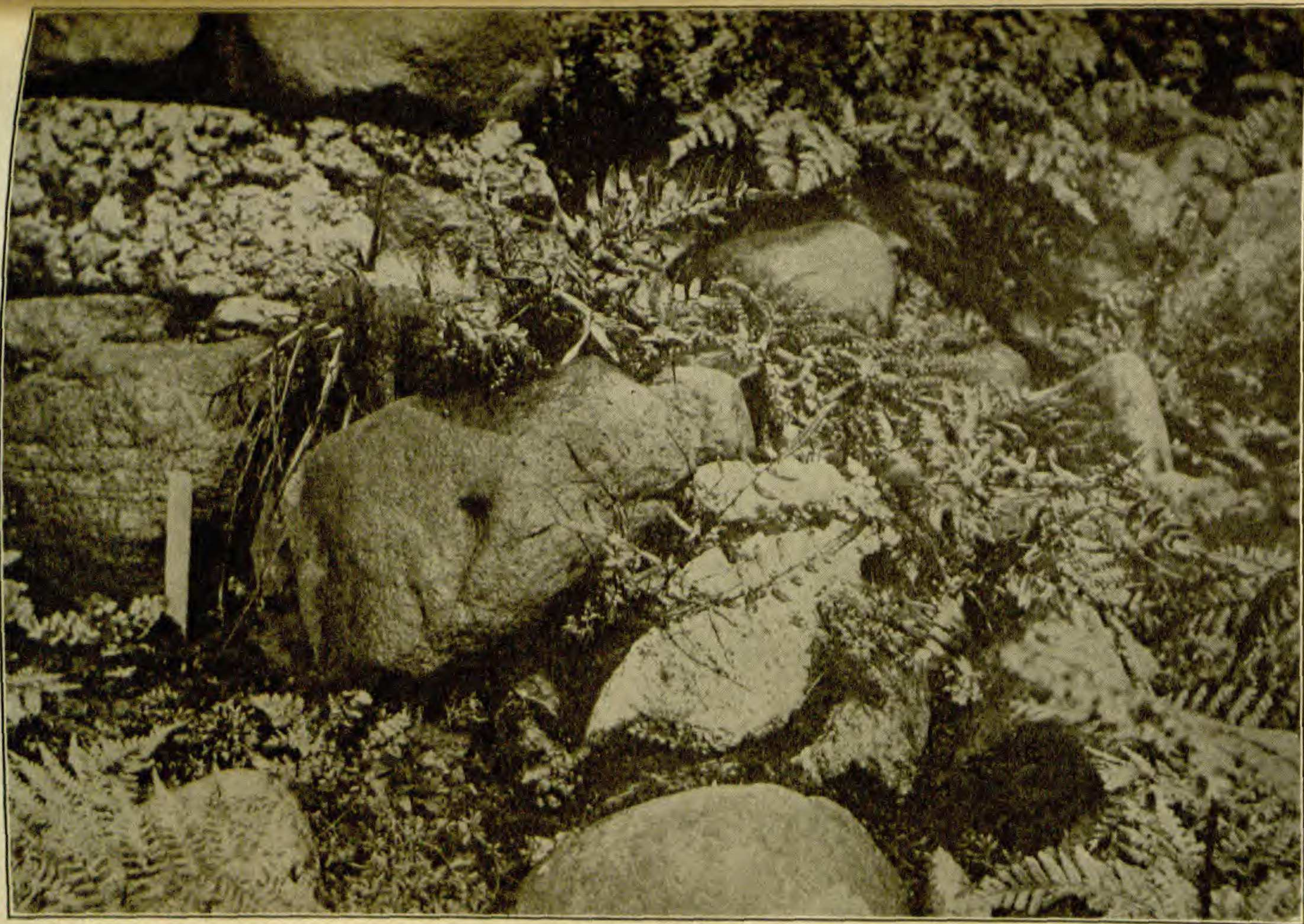
Several small plants of purple cliff brake were transferred to the home garden; these have increased in size and number of fronds including tall fertile fronds.

Numerous sporelings have appeared on or below my limestone cliff; some of them may be seen in the illustration. These are being watched to see how they develop. One, at least, is Maidenhair Spleenwort, others may be Lady or Marginal Shield fern.

In the construction of my limestone "cliff" I made use of a few pieces of limestone that I had obtained, but not having enough, I made a substitute—hard coal cinders crushed and mixed with sand and lime and a little cement to give strength; this aggregate was thoroughly mixed, with water added, and was cast into irregular slabs three or four inches thick.

For soil to pack between the layers of stone ordinary leafmold was used, but to overcome its probable acidity it was first put into a pail and lime water was poured over it from another pail of hydrated lime and water, after the lime had settled. This leafmold, when partially dry, was mixed with sand and limestone chips and was packed into the crevices as the pieces of stone were set in place.

Moss, brought from the woods, is very useful in a rock garden to pack into all cracks and surface voids. Sometimes the moss will grow and add to the attractiveness of the stones, giving an appearance of age to the rock ledges.



PELLAEA ATROPURPUREA, IN PLACE TWO YEARS; ASPLENIUM RUTAMURARIA (AGAINST WHITE STONE AT CENTER), TWO YEARS.

WOODWARDIA AREOLATA

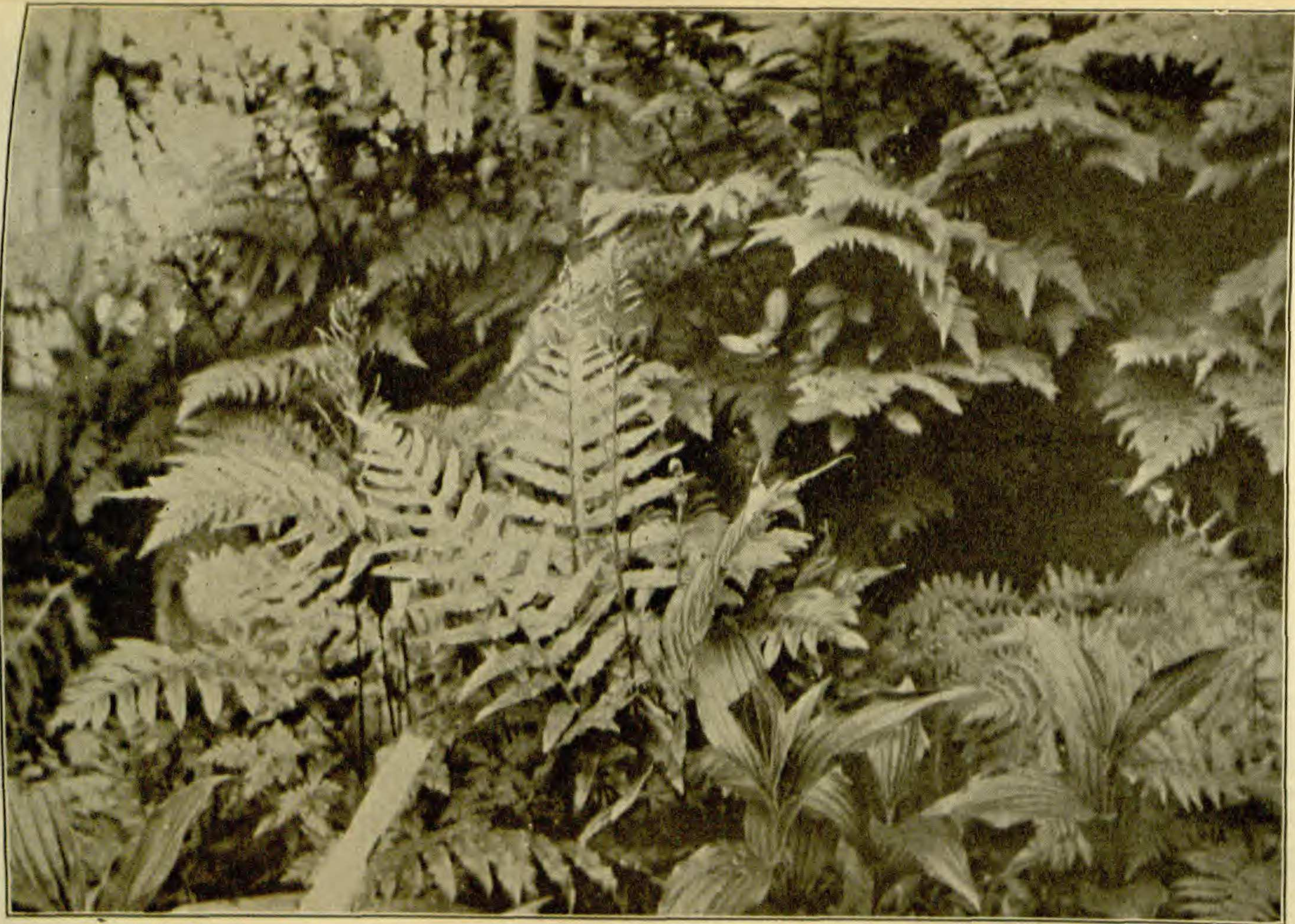
Woodwardia areolata recalls a fern-hunting expedition to the marshy woods south of Matawan, New Jersey, in 1928. The trip was made primarily in search of climbing fern, *Lygodium palmatum*. We were not successful in finding the *Lygodium* that day, but later it was found in great abundance farther north, only a short distance from New Brunswick, and on another trip we found it fairly plentiful in an area of several acres about three miles north of Indian Springs, New Jersey. It is to be hoped that the forest fires in that region during the summer of 1930 did not wipe out this fern station.

Woodwardia areolata was found growing in marshy woods along a sluggish stream and nearby on the sandy banks we found scattered specimens of *Dryopteris simulata* (at right in illustration).

Plants of both these ferns were brought home and transplanted in my miniature bog garden. Both have become well established and the clumps have increased in size. In fact, *areolata* is inclined to travel¹ and must be kept within bounds. It is a handsome fern and makes an attractive addition to the fern garden. Like *Lygodium*, it is at its best in late summer and early fall: at the end of October this year (1930), after several light frosts, it was still in perfect condition, the dark-stemmed fertile fronds standing well above the sterile fronds. Early in November a heavier frost caused the sterile fronds to wither, but the fertile fronds remained standing apparently untouched.

The "bog" garden is at the lowest end of the fern garden. An irregularly shaped hole, about eight feet long and five feet wide, was dug out about two feet deep

¹ See Mr. Pugsley's article in this JOURNAL 19: 88-91.—Ed.



WOODWARDIA AREOLATA, IN PLACE TWO YEARS.

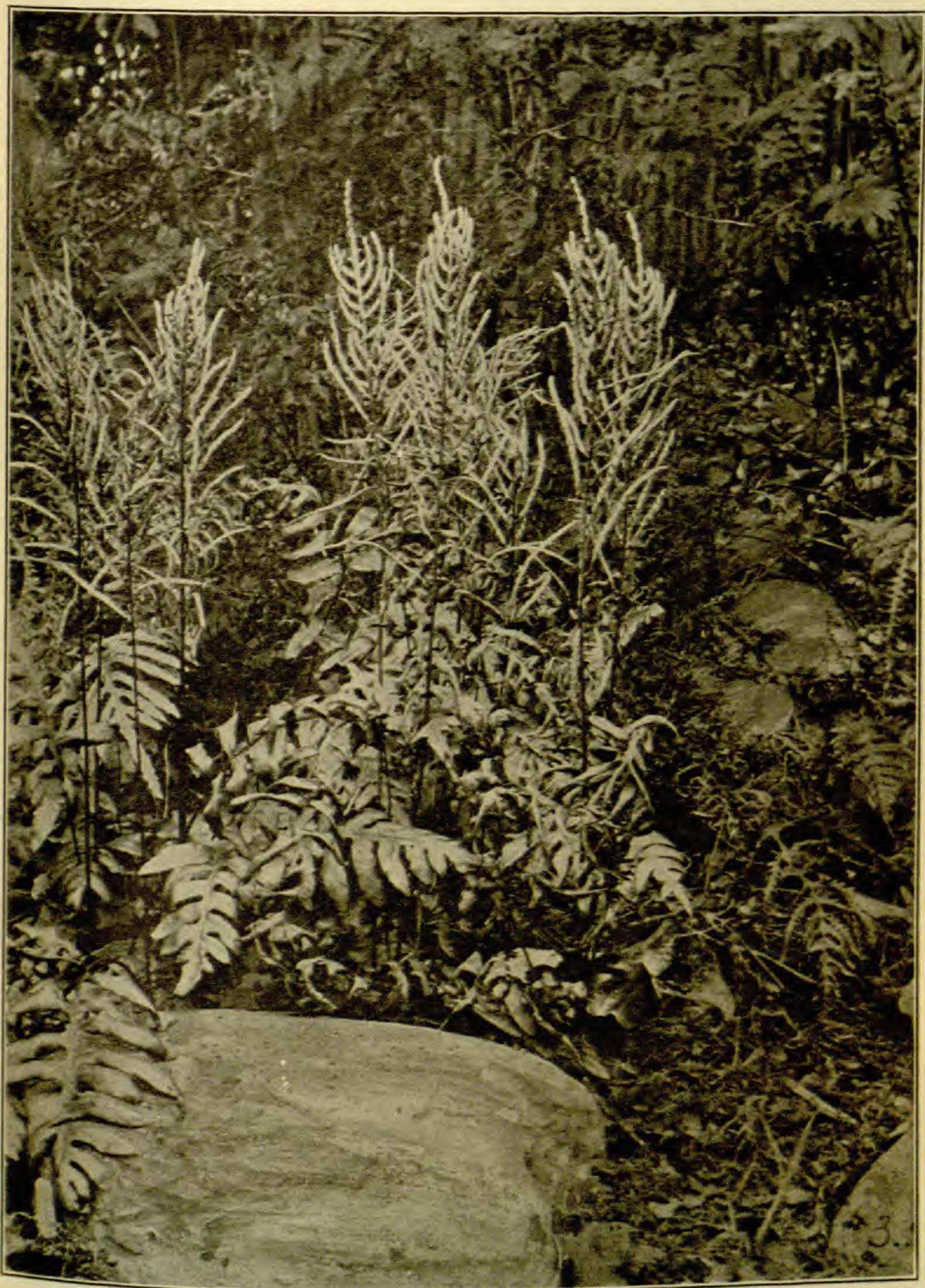
and was filled, first with a layer of small stones, then about six inches of decayed leaves and compost, and above that a mixture of sand, loam, humus and some peat moss. The upper two or three inches was mostly acid wood-mold, a little sand and peat moss, and some sphagnum moss. From time to time, when I have had an opportunity to gather fibrous acid soil from oak woods or cinnamon fern swamps, some of it has been scattered over the surface.

During wet weather the "bog" gets enough water from surface drainage, but during dry spells water is supplied through a hose. A tile drain a few inches below the surface prevents the water from rising so high as to flood the bog.

Besides the ferns mentioned above—*Lygodium palmatum*, *Dryopteris simulata* and *Woodwardia areolata*—there is a royal fern and *Woodwardia virginica*. The latter is even more of a wanderer than *areolata* and is inclined to crowd in among other plants and ferns where it is not wanted. This specimen has been reset several times; just at present it is trying to force its way among the cardinal flower.

Other plants are being tried in the bog garden; the above-mentioned clump of *Lobelia cardinalis* is especially vigorous. *Parnassia caroliniana* and *Arethusa bulbosa* have bloomed several times. *Cypripedium spectabile*, Pyxie ("flowering moss"), a sundew and *Iris verna* have all bloomed, but may not yet be fully established.

WEST ORANGE, N. J.



WOODWARDIA AREOLATA.—PHOTOGRAPH TAKEN NOV. 2, 1930, AFTER
A FROST SEVERE ENOUGH TO KILL FRONDS OF MOST FERNS.